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GB 1310331
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(71) Applicants
SKF Compagnie d'Applications Mecaniques, 1 Avenue Newton, 92140 Clamart, France
(72) Inventors
Marcel Fillon,
Maurice Roger Faurie
(74) Agents
Gill, Jennings & Every

(54) **Self centring clutch withdrawal bearing assembly**

(57) A self-centring clutch withdrawal bearing assembly comprises a guide sleeve 10 of plastics material with a radial portion 9 and a ball bearing mounted on the sleeve. The bearing has an inner bearing ring 2, which, in operation, engages with the clutch and an outer bearing ring 6. The bearing is held on the sleeve 10 by means of a radial portion 8 of the outer bearing ring 6 which is clamped against the radial portion 9 of the sleeve. The clamping is effected by a series of resilient tongues 16 which are moulded integrally with the portion 9 of the sleeve. This allows the portion 8 to move radially under the frictional restraint of the contact with the portion 9 to allow the bearing to centre itself with respect to the clutch as the ring 2 engages with the clutch. The formation of the clamping means, consisting of the tongues 16, integrally with the sleeve 10 simplifies the construction of the assembly as a whole.

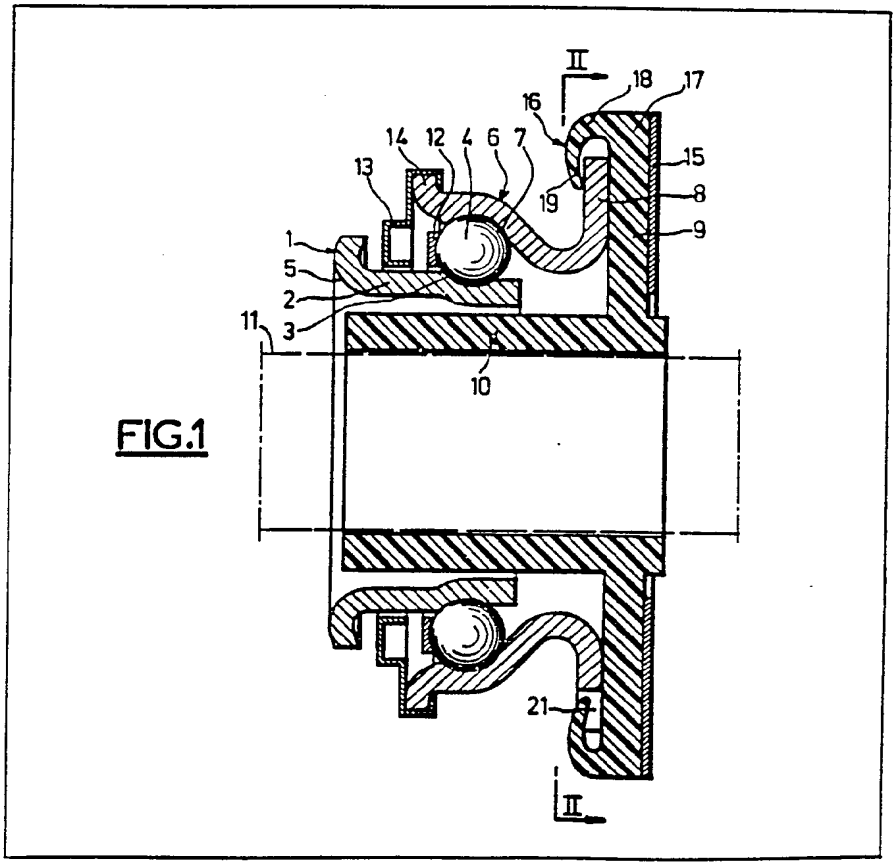

FIG.1

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FIG.1

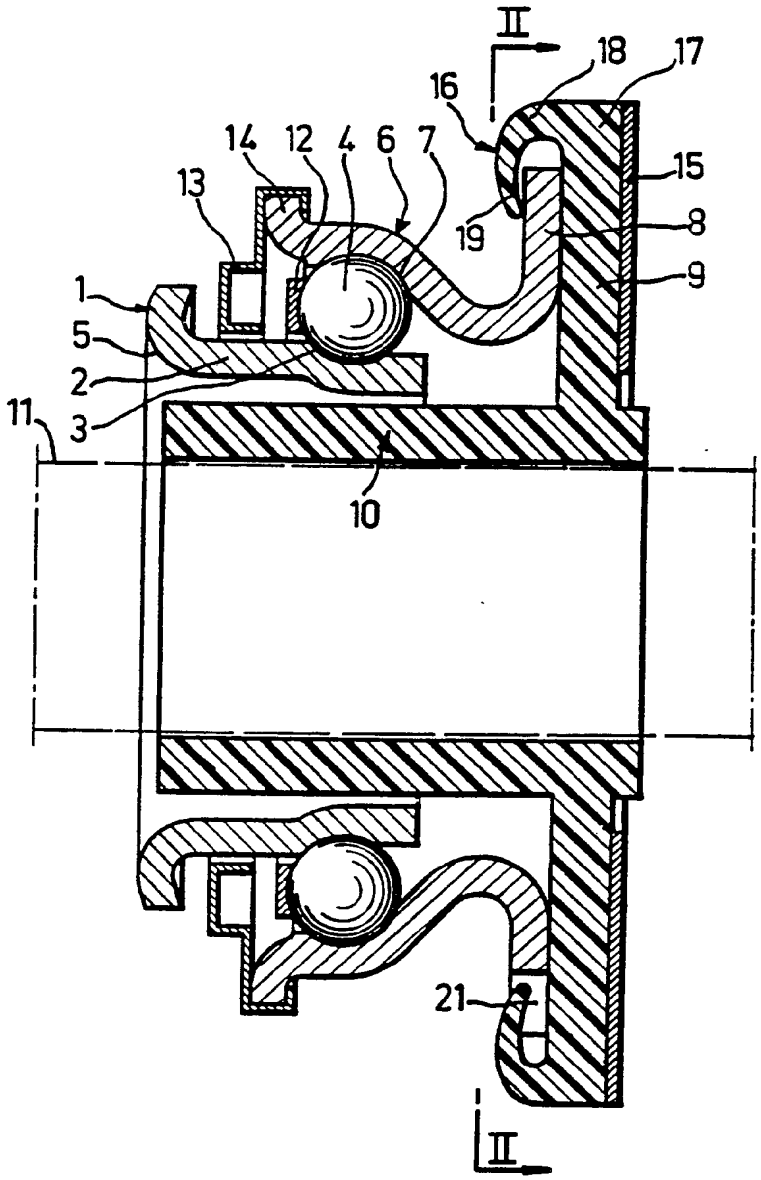

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FIG.2

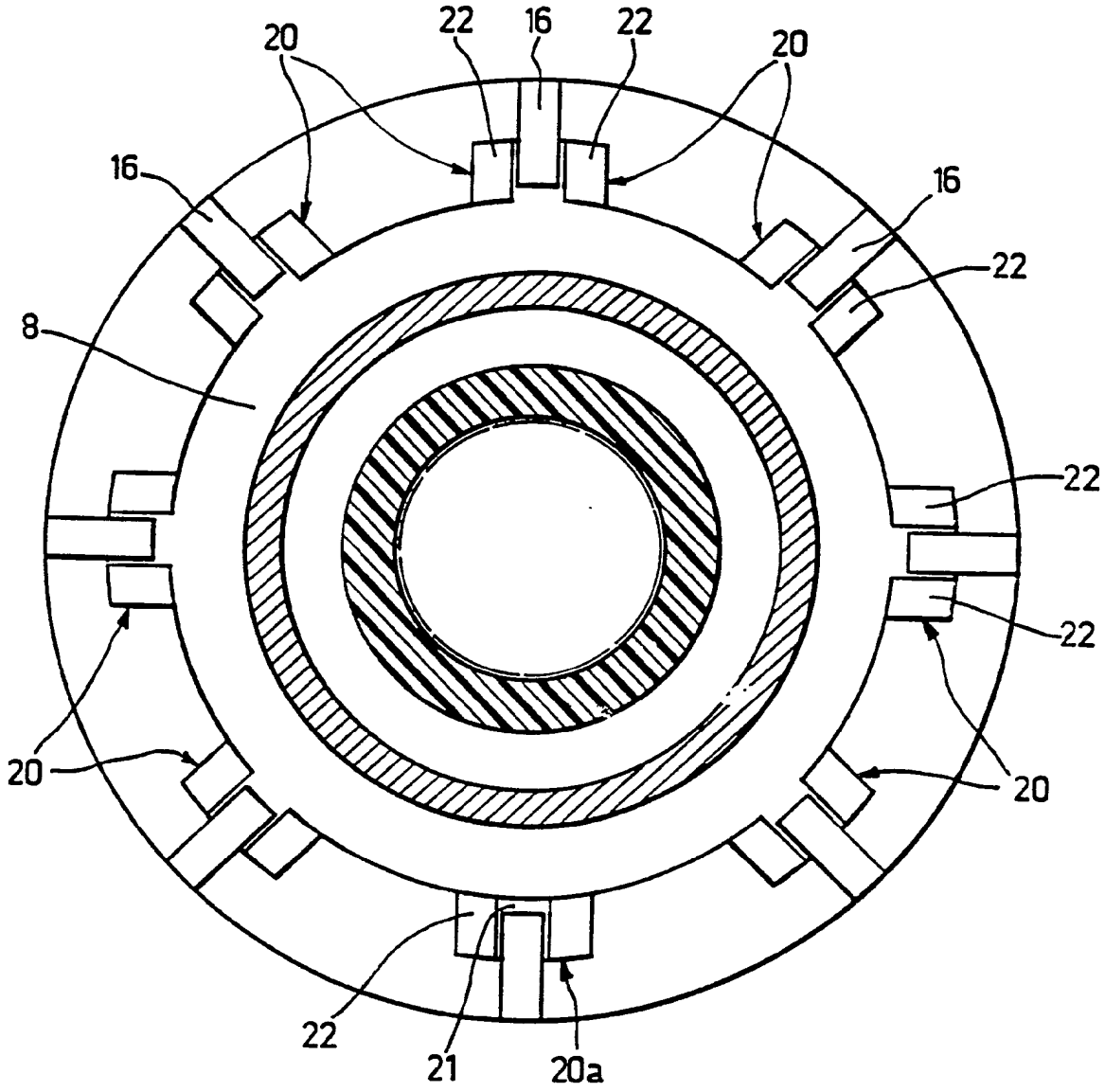

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FIG.3

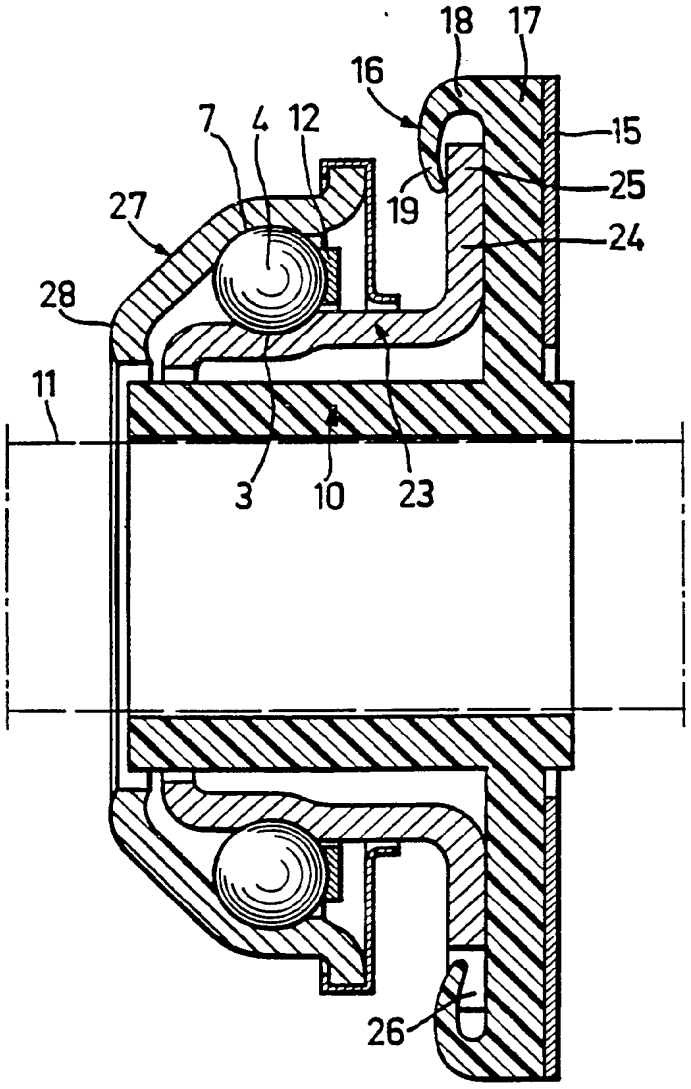

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FIG 4

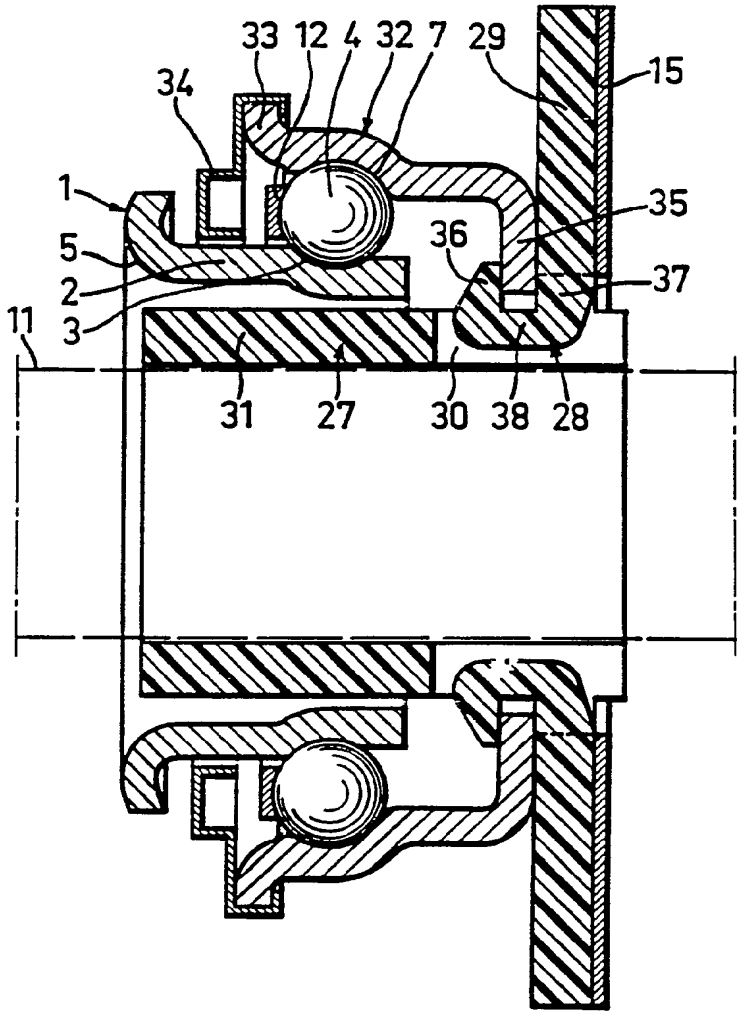

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FIG.5

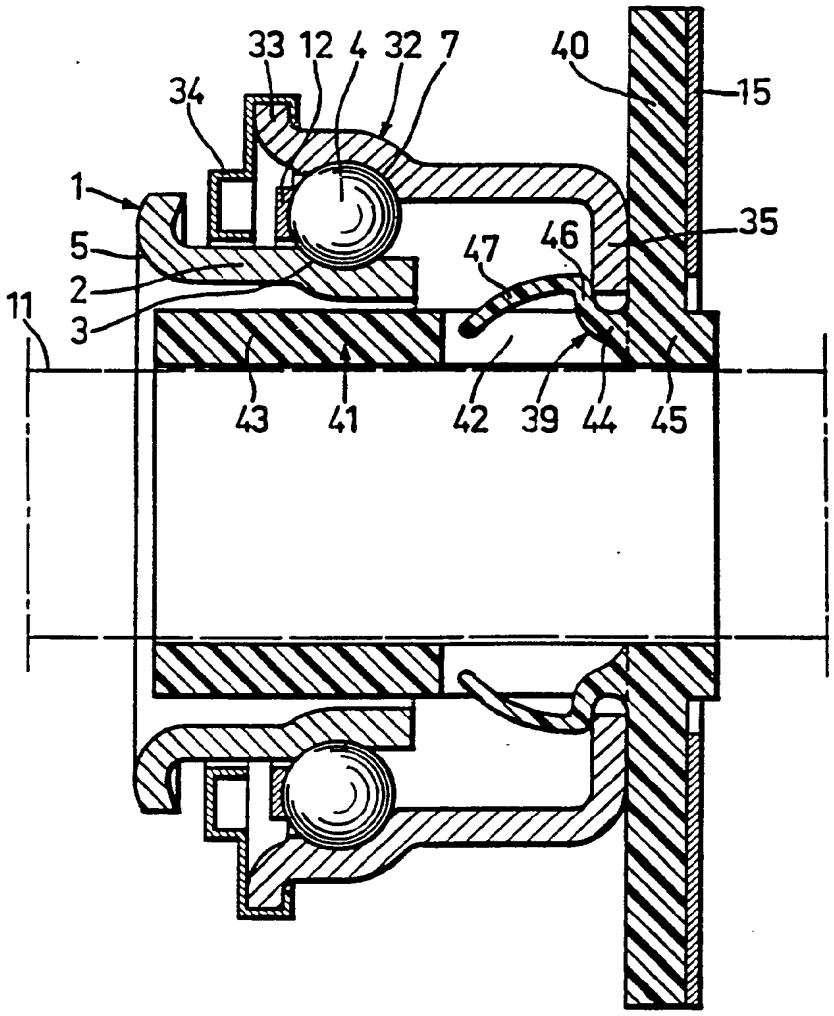

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FIG.6

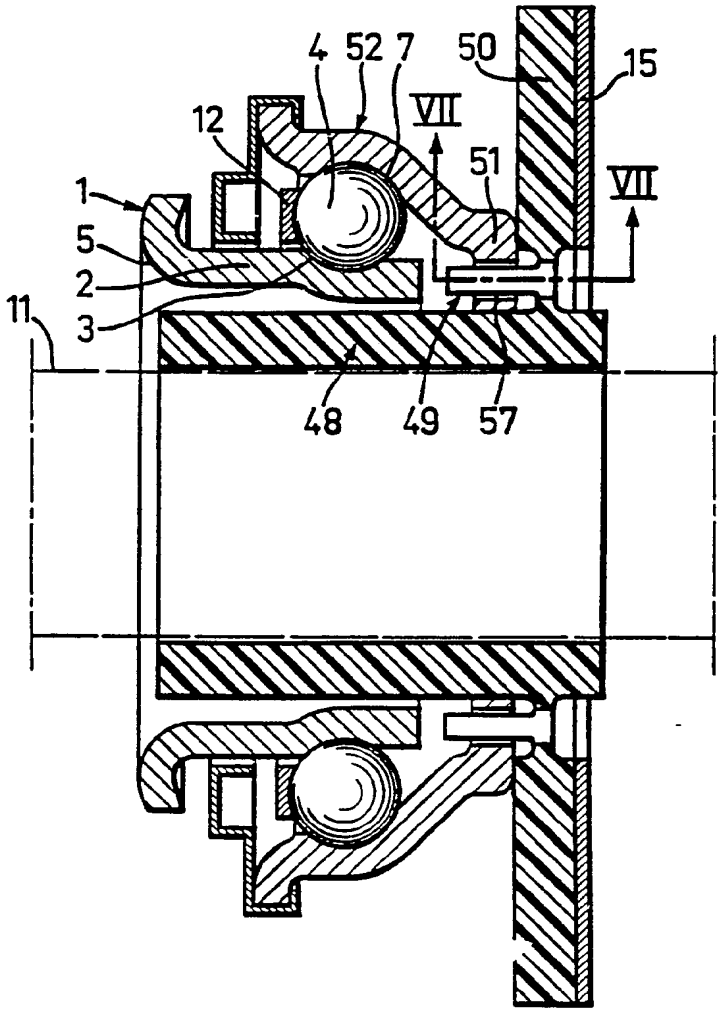
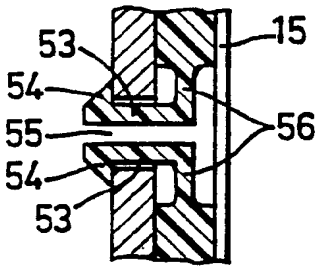


FIG.7



SPECIFICATION

Self-centring clutch withdrawal bearing assembly

The present invention relates to clutch withdrawal bearing assemblies which have means which ensure self-centring of the bearing during operation while a clutch is being disengaged by the bearing assembly. The invention is particularly concerned with clutch withdrawal bearing assemblies for use with diaphragm clutches, the assembly comprising a guide sleeve which, in use, is slidable axially on a guide tube, the sleeve having a radially outwardly extending portion, a rolling contact bearing which has an inner bearing ring and an outer bearing ring, one of the bearing rings having a portion which is in frictional sliding contact with one face of the radially outwardly extending portion of the sleeve, and the other bearing ring, in use, engaging with a clutch release member. The frictional sliding contact enables substantially radial movement of the bearing to take place to bring it into a position which is correctly centred with respect to the axis of rotation of the clutch, this position being maintained after the declutching operation.

Existing assemblies of this type include resilient means which enable the sliding movement of the bearing with respect to the guide tube, which is part of the gearbox of the vehicle, to take place. A radially extending part of one of the bearing rings is in frictional sliding contact with the radially extending portion of the sleeve. Hence at the time of the first declutching operation the thrust-bearing may move in the radial direction, the respective surfaces of the bearing ring and of the guide sleeve ensuring a certain frictional restraint under the action of the resilient means.

The guide sleeve is commonly made of synthetic material, for example, by moulding. This enables the bearing assembly as a whole to be lightened and the sliding of the sleeve along the guide tube to be improved.

The object of the present invention is to simplify the construction and manufacture of clutch withdrawal bearing assemblies of the type initially described by reducing the number of parts to be assembled.

To this end, according to this invention, we provide a self-centring clutch withdrawal bearing assembly comprising a guide sleeve which, in use, is slidable axially on a guide tube, the sleeve having a radially outwardly extending portion, a rolling contact bearing which has an inner bearing ring and an outer bearing ring, one of the bearing rings having a portion which is in frictional sliding contact with one face of the radially outwardly extending portion of the sleeve, and the other bearing ring, in use, engaging with a clutch release member, wherein the guide sleeve includes resilient clamping means, which is formed as an integral part of the sleeve and clamps a radially extending portion of the one bearing ring to the radially extending portion of the sleeve with the frictional sliding contact.

In a first example, the resilient clamping means is arranged around the periphery of the radially extending portion of the sleeve and is bent over substantially radially inwards in order to enclose a radially outwardly directed portion of the bearing ring.

In another example, the resilient clamping means is arranged near the radially innermost part of the radially extending portion of the sleeve and encloses a radially inwardly directed portion of the bearing ring.

Preferably, the resilient clamping means comprises a plurality of small tongues which exert clamping forces on that face of the radially extending portion of the bearing ring which is remote from a face which is in contact with the radially extending portion of the sleeve in order to ensure the self-centring action of the bearing. The radially extending portion of the bearing ring then advantageously has radial protrusions which co-operate with the tongues. In order to ensure locking of the bearing against rotation with respect to the sleeve, one of the radial protrusions preferably has a recess into which one of the tongues extends.

In one example, the tongues, which are resiliently flexible and form integral parts of the guide sleeve, each have a bent-back portion which can be deflected to enable fitting together of the assembly by snapping into position. The tongues are arranged at right angles to openings in the cylindrical portion of the guide sleeve. The roots of the bent-back portions of the tongues may form an extension of the cylindrical portion of the sleeve or alternatively of the radially extending portion of the sleeve.

In another example, the resilient clamping means comprises a plurality of studs which fit in recesses in the radially extending portion of the bearing ring and are each provided at its free end with a snap-in nose. These studs are integral with a thinned-down part of the radially extending portion of the guide sleeve so that they have the elasticity necessary to provide the self-centring action.

The assembly may include a bearing the inner bearing ring of which rotates and comes into contact with the clutch diaphragm or other clutch release member or it may include a bearing the outer bearing ring of which rotates and co-operates with the release member, the inner bearing ring then being stationary. In each case the guide sleeve co-operates with a radially extending portion of that bearing ring which is stationary.

Some examples of clutch withdrawal bearing assemblies in accordance with the invention are illustrated in the accompanying drawings in which: —

Figure 1 is an axial section through a first example in which the resilient clamping is effected by means of a plurality of tongues which co-operate with radial protrusions on a stationary outer bearing ring;

Figure 2 is a section along the line II—II in

Figure 1;

Figure 3 is an axial section through a second example, in which the inner bearing ring is stationary and the outer ring is rotatable;

Figure 4 is an axial section through a third example, in which the resilient tongues are arranged at the radially innermost part of the radially extending portion of the sleeve;

Figure 5 is an axial section through a modification of the example shown in Figure 4;

Figure 6 is an axial section through a further example in which the resilient clamping means comprise clamping studs; and

Figure 7 is a section along the line VII—VII in Figure 6.

As shown in Figures 1 and 2, the first example includes a thin walled inner bearing ring 1 which is produced by stamping metal sheet or tubing and has a tubular portion 2 and a toroidal raceway 3 for a row of balls 4. The tubular portion 2 is extended by a toroidal portion 5 which, in operation, comes into contact with the surface of a diaphragm or of an equivalent clutch release member, not shown, which enables the clutch to be disengaged. Hence in this example the inner bearing ring 1 is rotated as long as it is in contact with the clutch release member.

The ball bearing of the assembly also has a stationary outer ring 6, which is likewise thin-walled and is produced by stamping metal sheet or tubing. The outer ring 6 has a toroidal raceway 3 for the balls 4 and a radially extending portion 8 which is directed outwards. The portion 8 is on the side of the balls 4 remote from the toroidal portion 5 of the inner ring 1. A portion of the frontal annular surface of the radial portion 8 lies in frictional sliding contact with a radially extending annular integral portion 9 of a guide sleeve 10 preferably produced from reinforced synthetic plastics material and able to slide along a guide tube 11 shown in chain-dotted lines in Figure 1.

The rolling contact bearing of the assembly is completed by a cage 12 which retains the balls 4 and a protective cover 13 crimped on to a radial part 14 directed outwards from the outer ring 6. An annular wear plate 15 in the form of a metal washer cover the front face of the radial portion 9 of the sleeve 10, which lies remote from the face which is in contact with the radial portion 8 of the outer ring 6. At the time of operation of the assembly a clutch withdrawal fork, not shown, bears against the wear plate 15 and thus brings about an axial movement of the whole of the assembly with respect to the guide tube 11, the guide sleeve 10 sliding on the guide tube.

Resilient clamping between the radial portion 9 and the outer ring 6 is effected by a plurality of resilient tongues 16 which form integral parts of the radial portion 9 of the guide sleeve 10. The resilient tongues 16 are arranged at the periphery of the radial portion 9 of the sleeve 10. The tongues each comprise a base portion 17 directed substantially axially in the direction of the rolling bearing, that is to say, away from the wear plate 15. The base portion 17 is followed by a bent-back portion 18 which in turn terminates in an end 19 which is thinned down and is directed substantially radially inwards. Owing to this particular shape, the tongues 16 have a suitable elasticity.

The number of resilient tongues 16 is selected according to requirements. In the example illustrated there are eight tongues 16.

The radial portion 8 of the outer ring 6 has at regular intervals around its outer periphery radial protrusions 20 identical in number to that of the tongues 16 and each co-operating with one of the resilient tongues 16.

In order to ensure locking of the guide tube 10 and the outer ring 6 against relative rotation, one of the radial protrusions 20, referenced 20*a*, has a recess 21 which can be seen in Figures 1 and 2 and the dimensions of which are greater than those of the resilient tongues 16. The resilient tongue 16 which co-operates with the radial protrusion 20*a*, can therefore fit with a certain clearance into the recess 21. The end 19 of the tongue 16 then engages with the radial flanks of the recess 21 to prevent any rotation with respect to the fixed inner ring 6.

In order to facilitate assembly, each radial protrusion 20 preferably has two chamfers 22 which enable the ends 19 of the tongues 16 to be deformed progressively at the time of assembly by relative rotation of the outer ring 6 with respect to the guide sleeve 10.

At the time of operation of the assembly, a clutch withdrawal fork thrusts against the wear plate 15 in an axial direction and the assembly as a whole is moved axially with respect to the guide tube 11, the guide sleeve 10 sliding along the latter. The rolling bearing of the assembly can move in a plane normal to its axis of rotation in order to be centred with respect to the diaphragm of the clutch which comes into contact with the toroidal portion 5 of the inner ring 1 which is accordingly rotated. The automatic centring is obtained by radial movement of the bearing, the radial portion 8 of the fixed outer ring 6 being held in frictional sliding contact with the adjacent face of the radial portion 9 of the guide sleeve 10. The friction necessary to maintain the self-centring is generated by the resilient clamping force in the axial direction obtained by the resilient tongues 16 co-operating with the radial protrusions 20. The movement of the bearing with respect to the guide sleeve 10 is made possible by a suitable clearance existing between the inner ring 2 and the outer cylindrical surface of the guide sleeve 10.

The example of Figure 3 in which identical parts carry the same reference numerals as in Figures 1 and 2, differs from the example of Figures 1 and 2 only in that the inner ring of the bearing is fixed and the outer ring is rotatable. Hence the inner ring 23 includes, in this example, a radial portion 24 directed outwards and playing exactly the same role as the radio portion 8 of the outer ring 6 of the example of Figures 1 and 2. For this purpose the radial portion 24 likewise has at its periphery a plurality of protrusions 25, one of which includes a

locking recess 26.

The bearing has a rotatable outer ring 27 having a toroidal portion 28 which engages with the surface of a diaphragm, which is not shown, when the clutch is to be disengaged.

In this example, the axial clamping which ensures the self-centring of the bearing is produced by the resilient tongues 16 which are integral with the radial portion 9 of the guide sleeve 10 and which co-operate with the protrusions 25 on the fixed inner ring 23.

In the example of Figure 4, in which identical parts bear the same references as in Figures 1 and 2, the guide sleeve 27 has a different structure. In this example the resilient tongues 28 are arranged substantially at the innermost part of the radial portion 29 of the guide sleeve 27. They are deformed elastically whilst entering openings 30 suitable for this purpose in the cylindrical portion 31 of the guide sleeve 27, the openings 30 being arranged at the end adjacent the wear plate 15 of the cylindrical portion 31.

A fixed outer bearing ring 32 includes a radial portion 33 on to which is crimped a protective cover 34 and a radial portion 35 which is directed inwards and which is in frictional sliding contact with the front face of the radial portion 29 of the guide sleeve 27. The inner periphery of the radial portion 35, which is in the form of a continuous collar in the example illustrated in Figure 4, is clamped against the radial portion 29 by clamping noses 36 which are bent back outwardly from the resilient tongues 28.

It will be observed that in this example each resilient tongue 28 has a base portion 37 directed substantially radially inwards and forming an extension of the radial portion 29. The base portion is followed by a portion 38 which is bent back substantially axially and terminates in the clamping nose 36. At the time of mounting the rolling contact bearing on the guide sleeve 27, the resilient tongues 38 are deformed in order to allow the radial part 35 to pass by them. The part 35 is then enclosed by the noses 36 of the several resilient tongues 28.

Although in the example illustrated in Figure 4, the radial portion 35 is in the form of a continuous collar it will be understood that it would be possible to provide equally well a different construction of this radial portion, in particular with a plurality of protrusions as in the examples of Figures 1, 2, and 3.

The example of Figure 5, in which the identical parts bear the same references as in Figures 1 and 2, differs from the example of Figure 4 only in the shape of the resilient tongues. That is, in this example resilient tongues 39 which enclose the radial portion 35 of the fixed outer ring 32 are likewise arranged near the innermost part of the radial portion 40 of the guide sleeve 41. They may likewise be deflected at the time of fitting together of the assembly into openings 42 in a part of the cylindrical portion 43 of the guide sleeve 41 near the innermost part of the 40 next to the rolling bearing of the assembly. In this example, the resilient tongues 39 each include a base portion 44 which forms an extension in a substantially axial direction of the cylindrical portion 45 of the guide sleeve 41 which lies at right angles to the radial portion 40. The base portion 44 is bent back substantially through 90° radially outwards into a thinned-down clamping portion 46 which acts against the radial portion 35 to exert an axial clamping force against the radial portion 40 of the guide sleeve 41. The resilient tongue 39 is followed by a portion 47 bent back in a substantially axial direction, the free end of which, being slightly inclined towards the axis of the bearing, enters the opening 42. At the time of fitting together of the assembly by snapping-in the rolling contact bearing, the part 35 progressively deforms the resilient tongues 39 by bearing against the sloping ends of the portions 47 which enter still further into the openings 42.

As in the example of Figure 4, the radial portion 35 which is in the form of a collar, may in this example be replaced by a radial portion including a plurality of protrusions as in the examples of Figures 1, 2 and 3.

In the example illustrated in Figures 6 and 7, in which identical parts bear the same references as in the preceding Figures, the resilient clamping means consists of four studs 49 arranged near the innermost part of a radial portion 40 of the guide sleeve 48. These studs 49, which are directed substantially axially towards the bearing, co-operate with a radial portion 51 of a fixed outer ring 52. In order to do this, each stud 49 comprises as may be seen in particular in Figure 7, two small tongues 53 each having a clamping nose 54, the tongues 53 being separated by a recess 55. The two tongues 53 are attached to a thinned-down portion 56 of the radial portion 50 of the guide sleeve 48. The two clamping noses 54 of the studs 49 bear against the opposite face of the radial portion 51, the studs 49 entering radial recesses 57 in the bore of the radial portion 51. At the time of fitting together of the assembly by snapping-in the bearing on the guide sleeve 48, the tongues 53 can be deformed owing to the existence of the recesses 55 in order to enable the studs 49 to be introduced into the recesses 57 and to enable the snapping-in of the noses 54.

The elasticity or resilience of the clamping at the time of operation of the assembly and self-centring of the bearing is ensured in this example by the thinned-down portions 56.

In all the examples, significant simplification is obtained in the manufacture and fitting together of the assembly owing to the integration of the resilient clamping means, which enable the self-centring to take place, with the guide sleeve which is preferably made by moulding from synthetic plastics material.

CLAIMS

1. A self-centring clutch withdrawal bearing assembly comprising a guide sleeve which, in use, is slidable axially on a guide tube, the sleeve having a radially outwardly extending portion, a

rolling contact bearing which has an inner bearing ring and an outer bearing ring, one of the bearing rings having a portion which is in frictional sliding contact with one face of the radially outwardly extending portion of the sleeve, and the other bearing ring, in use, engaging with a clutch release member, wherein the guide sleeve includes resilient clamping means, which is formed as an integral part of the sleeve and clamps a radially extending portion of the one bearing ring to the radially extending portion of the sleeve with the frictional sliding contact.

2. An assembly according to claim 1, in which the resilient clamping means is arranged around the periphery of the radially extending portion of the sleeve and is bent over substantially radially inwards in order to enclose a radially outwardly directed portion of the bearing ring.

3. An assembly according to claim 1, in which the resilient clamping means is arranged near the innermost part of the radially extending portion of the sleeve and is bent over substantially radially in order to enclose a radially inwardly directed portion of the bearing ring.

4. An assembly according to any one of the preceding claims, in which the resilient clamping means comprises a plurality of tongues which exert clamping forces upon the face of the radially extending portion of the bearing ring remote from the face of the said portion which is in contact with the radially extending portion of the sleeve.

5. An assembly according to claim 4, in which the radially extending portion of the bearing ring has radial protrusions which cooperate one with each of the tongues.

6. An assembly according to claim 5, in which one of the protrusions has a recess in which one of the tongues engages to lock the bearing ring against rotation relative to the sleeve.

7. An assembly according to any one of claims 4 to 6, in which the tongues are deformable in order to enable fitting together of the assembly by snapping-in of the bearing ring and the tongues each include a bent-back portion arranged at right angles to openings in a cylindrical portion of the guide sleeve.

8. An assembly according to claim 7, in which the bent-back portions each include a base portion which forms an extension of the cylindrical portion of the sleeve.

9. An assembly according to claim 7, in which the bent-back portions each include a base portion which forms an inward extension of the radially extending portion of the sleeve.

10. An assembly according to any one of claims 1 to 3, in which the resilient means comprises a plurality of studs which are introduced into recesses in the radially extending portion of the bearing ring and which each has at its end at least one snap-in nose.

11. An assembly according to claim 10, in which the studs are integral with a thinned-down part of the radially extending portion of the guide sleeve.

12. An assembly according to claim 10 or claim 11, in which the studs each have two tongues, each tongue having a snap-in nose and the tongues being separated by a recess which increases the resilience of the tongues.

13. An assembly according to any one of the preceding claims, in which the bearing ring which has the radially extending portion is the outer bearing ring.

14. An assembly according to claim 1, substantially as described with reference to Figures 1 and 2, or Figure 3, or Figure 4, or Figure 5, or Figures 6 and 7, of the accompanying drawings.

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